



# *the* **ILLINOIS ENGINEER**

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How many engineering students march with the Illini? (See story, p. 2.)



THE ILLINOIS ENGINEER  
NOVEMBER, 1960  
VOLUME XXXVI, NO. 11

Undergraduate Division  
Navy Pier  
Chicago 11, Ill.

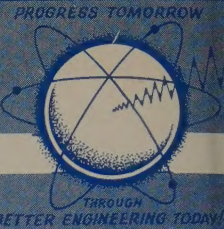




# THE ILLINOIS ENGINEER

ILLINOIS SOCIETY OF PROFESSIONAL ENGINEERS, Incorporated

Affiliated with the National Society of Professional Engineers



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The ILLINOIS ENGINEER is published monthly by the Illinois Society of Professional Engineers, Inc., at 714 Myers Building, Springfield, Illinois.

The Illinois Society of Professional Engineers is not responsible for statements made or opinions expressed in this publication.

Second-Class postage paid at Springfield, Illinois.

Subscription rates are \$2.00 per year in advance to members of the Illinois Society of Professional Engineers; \$4.00 per year in advance to non-members in U.S.A. and its possessions, Canada, and Mexico. Foreign \$6.00. Single copies 40c. Special issues \$1.00.

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# PROFESSIONALISM AND THE ENGINEERING STUDENT

By C. DALE GREFFE, P.E.

Vice President, I.S.P.E.

What are our colleges doing to help prepare our engineering students for effective participation in the field of engineering after graduation? This question is often asked, but seldom answered. In fairness to all concerned, it should be pointed out that this question does not generally relate to the preparation for doing engineering work. Instead, it concerns the preparation for professional conduct in the field of engineering.

For many years college training was limited to the study of formal course work with supporting laboratory exercises in the fundamental sciences and their applications in the field of engineering. The curriculum was so filled with this material that there was little time left to devote to other study. No doubt it was thought that the moral ethics imposed upon the individual by society and the influence of the social studies taken in the elementary and secondary schools provided adequate training in this area. In recent years most engineering curricula have been

made more liberal, providing time for several elective courses of a non-technical nature. This has brought about a reduction in the amount of course work directed to the major study. Even with some guidance, because of the great variety of courses available from which these non-technical can be selected, the end result often falls far short of the desired goal.

It is, therefore, true that large numbers of our engineering graduates leave the college campus each year without having formulated a definite attitude on professionalism. How can this situation be corrected? The problem has no easy solution. It is, indeed, a real challenge to the College administrators and their faculty.

Professionalism is a philosophy. It is a way of life for the engineer. It is the force that guides him in all of his activities; his relationship with his clients, his competitors, his superiors, his subordinates and his associates. His attitude, to the social, political and economical problems of his community, his church, and his family, all reflect his professional philosophy.

Teaching professionalism is a task that has many

facets. What program will provide for most effective teaching in this area? This is the unanswered problem.

In the engineering approach to the solution of a problem, we gather some data. If the data are sufficient, and correctly analyzed, a desirable solution may become apparent. Unfortunately, for this problem, there are very little data available. Unfortunately too, the available data are of such nature that there is no easy analysis. We must, therefore, be content with the answers to some rather general questions. Included among these general questions are the following: Why did the student enter college, and why is he studying engineering? What was his background before entering college? What does he hope to gain through his college study?

Why is the student in college? A direct answer to this question is seldom available. We are living in a society at a time when a college education is considered, by many, to be a necessary part of one's preparation for effective service to that society. Since the time of his birth his parents have planned for his college education. They naturally assume that he will want a college education. He has heard this for as long as he can remember. By the time he is graduated from high school he has accepted the idea of going to college. Many of his high school classmates will attend college. Why shouldn't he?

Why did he select engineering as his field of study? This is not easy to explain in many cases. He may have certain aptitudes that are useful in the study of engineering. He may have a strong interest in this area. These are the positive reasons. He may have selected engineering because he knew this to be his father's wish. He may have tried unsuccessfully in other areas such as physics, mathematics, law, or chemistry, and transferred into engineering to salvage something for his efforts. These are negative reasons.

Many students study engineering for one reason. It provides a means to an end, and is not an end in itself. He sees an opportunity for employment after graduation. This is his purpose. One serious implication follows from this statement. The average student will make an effort to acquire the necessary proficiency in those areas that seem related to this purpose. Those things that seem unrelated to this purpose are often ignored. A notable exception to this would involve those special interests that he, as an individual, may have. He fails

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## ENGINEERS MAKE MUSIC

Yes, it's true. The slide rule and the slide trombone are compatible. *Eighteen percent of the Marching Illini Football Band are students in the Engineering College at the University of Illinois.* If this figure surprises you, take a gander at these: In a study made two years ago, it was revealed that Purdue's Marching Band is composed more than 90% of engineering students. While this ratio in such a famous engineering school may not appear unusual, let's take a look at another Big Ten university. Minnesota's football marching band of 140 pieces, by a similar study two years ago, showed that their ranks were made up of engineering students to the "tune" of 65% (including the Drum Major).

A tradition of greatness, born under the leadership

of Albert Austin Harding, and continued under directors Mark H. Hindsley and Everett D. Kisinger, accompanies the University of Illinois football band. The precision-conscious Marching Illini demonstrate before the game and during half-time why they have been described as the greatest marching, playing, and singing group of their kind.

No Illinois football game would be complete without the splendor and grandeur provided by the band. Added to the unequalled precision movements are original and inspiring harmony produced by instruments of 175 highly trained musicians, and a third component—a cappella singing arrangements.

Illinois' band is credited with numerous "firsts",





Mark H. Hindsley

including field formations, a cappella singing, and presentation of complete programs with predetermined signals in the music, without the aid of pistol shots or whistles.

Each maneuver calls for tremendous amounts of work before it takes form on the gridiron. First, Director Kisinger provides intricate planning. Special charts are made for each member of the band, with lines trac-

ing every movement. Marching cues must be marked on each sheet of music—music which is often times specially arranged to fit the instrumentation and show theme. Then, hours are spent rehearsing on the field and in the bandroom.

The Illinois Society of Professional Engineers congratulates the entire staff and ALL the students responsible for the traditionally fine performances by the Marching Illini. Naturally, the members of the engineering profession are proud to learn that so many of their successors are "going that extra mile" to contribute their versatility, time and talent to the service of their university, not only at Illinois, but throughout the Big Ten. Such dedication is a major factor in the incomparable quality for which the marching bands in the Big Ten have become so famous.



Everett D. Kisinger

### Football Band Members in Engineering College University of Illinois

Lloyd E. Askew	Champaign, Illinois
Stephen D. Berry	Eldena, Illinois
Richard C. Bokhoven	Chicago Heights, Illinois
William S. Butler	Danville, Illinois
Ronald R. Colwell	Tuscola, Illinois
Robert Compratt	Steger, Illinois
Barry W. Doan	Rockford, Illinois
Michael R. Gamble	Fort Wayne, Indiana
Howard S. Gelber	Chicago, Illinois
David C. Giffen	Aledo, Illinois
Donald V. Gubser	Alton, Illinois
George W. Henry	East Peoria, Illinois
George M. Highsmith	Olney, Illinois
Richard D. James	Peoria, Illinois
Marvin Janssen	Baileyville, Illinois
Scott D. Johnston	Shattuck, Oklahoma
Sheldon G. Kirschner	Skokie, Illinois
George Kuhns	Hinsdale, Illinois
Philip B. Lindsay	Champaign, Illinois
Don G. Lockhart	Greenview, Illinois
Royce A. Lorentz	Chester, Illinois
Stephen J. Madden	Springfield, Illinois
Ronald W. Martin	Skokie, Illinois
Jerry E. Minnear	Wheaton, Illinois
David E. Perkins	Chicago, Illinois
William R. Punkay	Champaign, Illinois
Carl P. Reiners	Chicago, Illinois
Marvin C. Rogers	Flossmoor, Illinois
John P. Schill	Chicago 40, Illinois
Andrew W. Seacord	Western Springs, Illinois
Robert E. Seyler	Champaign, Illinois
Kenneth R. Slonneger	Peoria, Illinois
Edward T. Snyder	Lemont, Illinois
Allen D. Sypherd	Macomb, Illinois
Robert E. Terry	Wheaton, Illinois
Everett L. Triefenbach	Marissa, Illinois
Fred G. Troppe	Joliet, Illinois
James T. Wormley	Oswego, Illinois
William C. Zahrobsky	Berwyn, Illinois

NEW MEMBERS FOR I.S.P.E. ARE MUSIC TO OUR EARS AND ADD STRENGTH TO ACCOMPLISH  
OUR OBJECTIVES. EVERY MEMBER GET A MEMBER!



## REPORTS OF NATIONAL DIRECTORS NSPE FALL MEETING—DENVER OCTOBER 19-21, 1960

### FRANK EDWARDS REPORTS:

#### GROWTH

ISPE membership growth has added another vote (now totalling 5) on the NSPE Board. However, other states are doing better, thus causing Illinois to slip to sixth place in this year's rating among the seven societies



Frank Edwards

having greatest potential membership. Pennsylvania proudly displayed the first place banner for this group of societies during the Denver meeting. National Directors Amstutz, Edwards and Missman attended the NSPE Board sessions which started Wednesday evening and finished Friday noon. A tour Friday afternoon was followed by dinner at the Air Force Academy, Colorado Springs.

#### ACTION

Numerous committee reports outlined major accomplishments during the past few months. Specific actions of the Board included:

- a. Endorsement of the part covering registration of engineers, of the model law recently adopted by the National Council of State Boards of Engineering Examiners. The part covering land surveyors was referred to committee for further study.
- b. Adoption of a budget of \$729,500 for 1961, an increase of \$69,500 over 1960.

The estimated income is as follows:

Dues, 48,300 members, 6100 juniors.....	\$664,500
Advertising .....	50,000
Sales .....	15,000
	<hr/>
	\$729,500

- c. Adoption of policy statement regarding engineering technicians and authorization of wide dissemination of information about NSPE sponsorship of a financially self-supporting Institute for Certification of Engineering Technicians. See AMERICAN ENGINEER, October 1960, page 27.
- d. Authorization to combine several existing policy statements for conciseness in POLICIES book to be reissued soon.
- e. Authorization to compile and issue legislative handbook for use of State Societies. Target date for distribution is January 1961.

- f. Recommendation to State Societies and Chapters to consider adoption of July 1 as beginning date for their administrative years so as to coincide with NSPE.
- g. Recommendation to State Societies to endorse officially the NSPE publication entitled "Ethics for Engineers."

#### PROGRESS

Significant advancements in the promotion of NSPE ideas were reported by the Inter-Society Relations and the Engineers in Industry Committee.

#### Unity

In 1958 the founder societies appointed a Past Presidents Task Force on Unity. This committee now recommends:

1. That the President and Vice President respectively of EJC, ECPD, and NSPE meet at least four times a year for the purpose of recommending procedures for

- a. Eliminating undesirable duplicate effort
- b. Improving effectiveness and efficiency in the total society effort

and for the purpose of

- a. Supporting one another's programs in principle and spirit and actively where feasible
- b. Undertaking any other steps that are in the best interest of the engineering profession that can be handled best by this unified approach.

2. That the founder societies who created this committee endorse these recommendations and effectively present them for endorsement by the constituent societies of EJC and ECPD for the purpose of providing the maximum support for the proposal.

Members of ISPE will recognize this as the AIEE functional plan which has been adopted by AIEE, ASME and NSPE. This big step forward in the unity effort, despite its informal nature, is gratifying.

#### Labor Unions

The Engineers in Industry Committee has been active in the unionization problem. Three important developments are reported here.

At the Sperry Gyroscope Company engineers and technicians voted 1724 to 1509 against continuing representation by the Engineers Association, IUE, AFL-CIO. NSPE representatives provided considerable assistance to leaders of the Sperry Engineers in the decertification movement. A general meeting was sponsored by local chapters a week before the vote and speakers discussed professionalism versus unionism. An open letter to Sperry Engineers corrected several untrue union statements.

At the Chrysler Airtemp Plant at Dayton, Ohio an attempt of IUE to represent engineers was thwarted



when the union agreed at a preliminary meeting to exclude professional employees from the voting unit. The Dayton Chapter prior to this decision sponsored a meeting during which NSPE representatives, company engineers and union spokesmen discussed the entire situation. The professional approach to engineer-management relations was presented and the separate voting rights guaranteed professional employees under the Taft-Hartley Act was explained. Again serious misrepresentations by IUE were corrected in an open statement to all Airtemp engineering employees.

At General Electric, Schenectady, New York, fast action by NSPE attracted some 300 engineers to a special meeting, promoted only by word of mouth, to listen to Milt Lunch, NSPE Staff Member talk on "Legal Rights of G.E. Engineers."

### MELVIN E. AMSTUTZ REPORTS:

I will limit my report on the Meeting to the activities of the Functional Section of Engineers in Government, of which I am Vice Chairman for the central area. This Functional Section has become a very active part of the operations of the Society and is ably chaired by Wesley E. Gilbertson, of the Public Health Service in Washington, D.C.

Functional Sections of Engineers in Government have been organized in 29 States and steps are being taken by the Executive Committee to promote Sections in the remaining States. It is hoped that our own State will expand the existing Functional Highway Section to include all Engineers in Government. The term "Government" includes all the divisions of Government, namely: Federal, State, County and Municipal.



M. E. Amstutz

The branches of the Military Forces employing professional engineers, either in uniform or out, have, in the last few years, taken a very active part in the activities of the N.S.P.E. and in the registration of their engineering personnel.

The armed services were represented at the Denver Meeting and at the Meeting of the Executive Committee of the Functional Section of Engineers in Government, by General R. W. Warren of the Corps of Engineers, and Lieut. Col. Stuart L. Davis of the U.S.A.F., both from Washington, D.C. They reported that the armed services were having difficulty in retaining young engineers. It was rather surprising to learn that 80% of their Engineering Officers were obtained from graduates from our Universities enrolled in the R.O.T.C. courses.

Past experience indicates that they are able to re-

tain only 13% of such Engineers on a permanent basis. This has caused a serious problem to the armed services. There has also been a decrease in the number of men voluntarily taking the advanced R.O.T.C. training courses. Part of such decrease in enrollment has been due to the failure of E.C.P.D. to grant credit for various required armed forces courses. General Warren stated that the average investment on the part of the Government who train the Engineering Officers is from \$8,000.00 to \$10,000.00.

After some discussion, General Warren was requested to write a brief report for presentation to N.S.P.E. including his recommendations.

Otto Mald, Vice Chairman from New York, reported on the New York City situation. Mayor Wagner of New York has been actively supporting the AFL-CIO in the unionization of professional engineers. The professional engineers in four departments of City government in New York are now represented by the union. It was also reported that the engineering personnel of various State Highway Departments are being pressured into union affiliation and that the entire Highway Department of one State has become affiliated with a union.

The Functional Section, as represented at the Denver Meeting, were unanimous in their opposition to the unionization of engineers, since it was felt that this was incompatible and out of keeping with true professionalism.

The Functional Section is publishing a Newsletter, the first issue of which is coming out this month. This

(Continued on page 9)

## THE ECONOMY OF New Deep Strength Asphalt-paved highways GETS YOU YOUR BIG ROADS PLUS...

... your all-important local and farm-to-market roads. You see, new DEEP STRENGTH Asphalt-paved super highways save up to 10% and sometimes up to 50% or more in construction costs. *Further, maintenance costs no more, often less.*

Money saved building big roads with heavy-duty DEEP STRENGTH Asphalt pavement means that much more money is available for building and improving your state's entire network of roads.

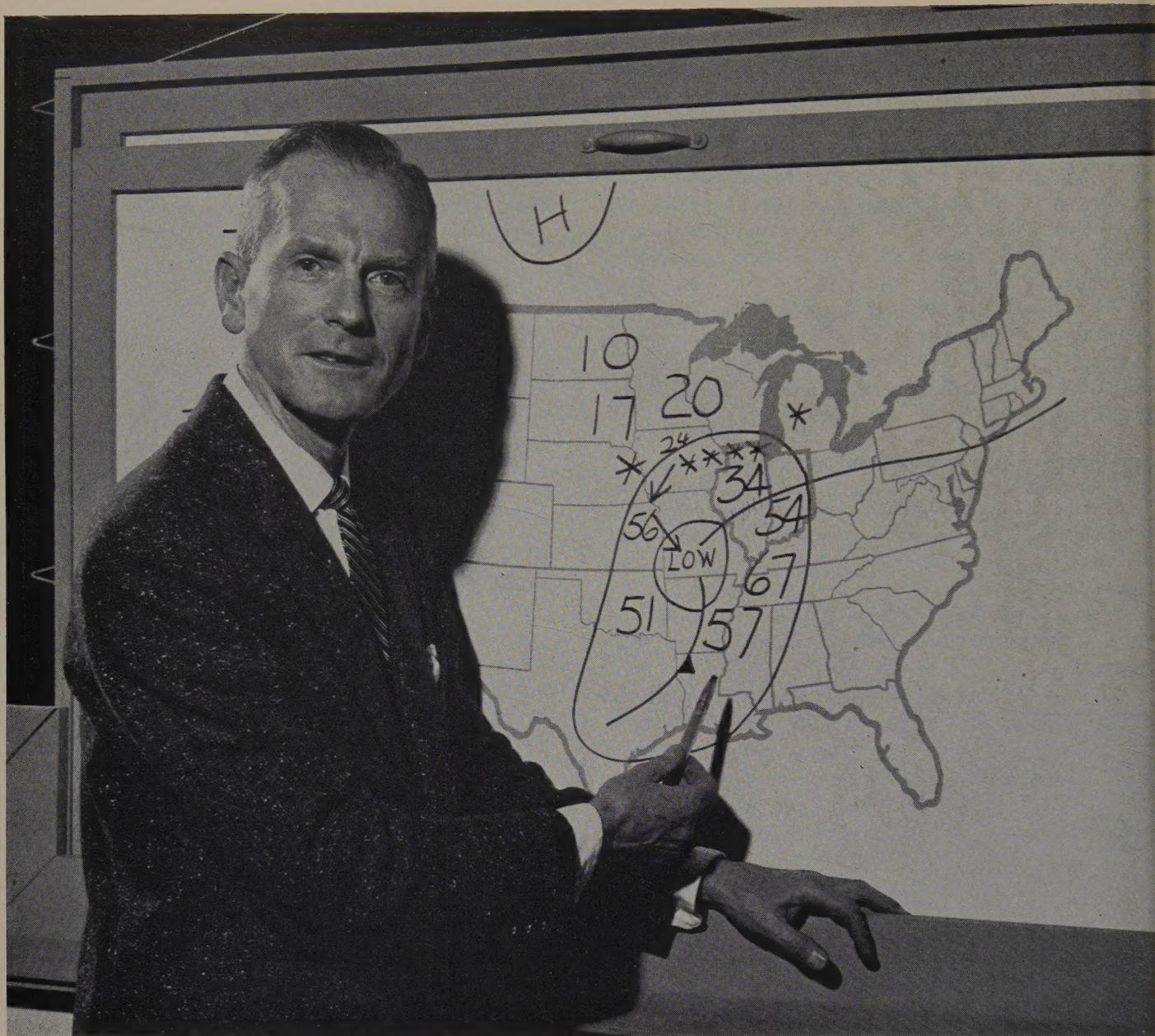


*Ribbons of velvet smoothness...  
ASPHALT-paved Interstate Highways*

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St. Paul 4, Minnesota





## ENGINEERING A WEATHER FORECAST

By W. J. ROBERTS, P.E.

"What are the chances of a temperature lower than 28°F during the next two days?" asked a familiar voice at the other end of the phone. I recognized my engineer friend's voice and knew what he was after. The structure he designed was now a mass of wooden forms waiting for the concrete. The contractor was all set to fill those forms. All he needed was a little cooperation from the weather. Fortunately, in this case a warm spell was on the way and my answer was easy. "Go ahead and pour concrete," I advised him.

This type of telephone conversation is not unusual as I pursue my evening "hobby" as late weatherman on WCIA-TV, Champaign, Illinois. For seven years I have lived a full life as engineer with the Illinois State Water

Survey by day and part-time television weatherman just before bedtime six nights a week. This has been an exacting but rewarding experience and it has shown me one fact: everyone depends on the weather to a greater or lesser degree.

Unlike engineering, weather forecasting or meteorology is not an exact science. A weather situation cannot be analyzed perfectly because too little is known about it. Weather is made up of many factors and the trick in making a good forecast lies in determining which arrangement of factors will predominate during a given forecast period. We can derive some idea of the complexity of the forecast problem by using a simple probability problem. Take the case of a coach who wishes to test out each man of his 12-man squad on the five positions of a basketball team. How many line-ups are possible for his basketball team of five if they are selected



at random from the 12 men? Engineers will immediately recognize this as a simple "factorial n" type of problem and come up with an answer of over 95,000 different line-ups. Of course no practical coach is going to try out 95,000 groups of 5 players. Instead, he relies on past experience, good judgment and with a little intuition arrives at his choice of the best team.

In weather forecasting it is not unusual to be faced with 12 variable factors—temperature, barometric pressure, state of the sky, direction of the wind, time of year, state of the ground, direction and movement of pressure systems, etc. Even if only 5 of these factors dominated the weather picture during the forecast period there could be slight variations which could produce many thousands of different kinds of weather during the forecast period. Up until relatively recent times weather forecasters have centered their chief attention on the moving cyclones and anticyclones which the patterns of isobars reveal on the weather map. Great attention was given to the forecasting of the paths and velocities of these low and high pressure areas and thus the influence on the weather as they passed. Usually they move with the prevailing westerlies in our latitude at an average velocity of 30 to 35 miles an hour in winter and 10 miles an hour slower in summer and their normal movement generally has an easterly component. When other indi-

cations are absent the forecaster will predict that a barometric depression will continue on its course with the same velocity and direction as during the past 12 to 24 hours. Changes in the direction and movement of a low pressure storm can sometimes be visualized by plotting the 3-hour pressure tendencies for a group of Weather Stations. Such pressure change charts make clearly visible the areas of rising and falling pressure thus indicating the current direction and speed of the pressure system.

Having made a decision as to where he will find the high and low pressure areas on the following day's weather map, the forecaster next tries to determine how the new distribution of pressure will affect the weather in his forecast area. Assuming that his pressure analysis is correct, the forecaster is on relatively strong ground when he forecasts wind, temperature, cloudiness and precipitation. For instance, wind is directly related to pressure distribution and the shape and packing of the isobars will control the direction and approximate speed of the wind. Wind in turn controls temperature changes, thus a wind blowing from the south will generally indicate an increase in temperature whereas one from the north will mean cooler weather. Within broad limits, cloudiness and precipitation can usually be delineated in a moving depression.

(Continued on page 10)

## CONCRETE PIPE-O-GRAM

THE CONCRETE PIPE INDUSTRY IS GEARED FOR THE 60'S.

LARGE INVESTMENTS IN IMPROVED CONCRETE PIPE—

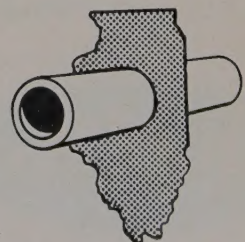
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## TRI-CHAPTER MEETING HONORS NEW REGISTRANTS

On October 20th, the ISPE Chapters of Capital, Central Illinois and Champaign County held a joint meeting to honor new registrants. ISPE President, L. D. Hudson, spoke on "Pro-Power."



**BACK ROW** (Left to Right): Warren S. Daniels, Pres., Champaign County Chapter; John R. Castle, Pres., Central Illinois Chapter; Charles L. Ritchie, Pres., Capital Chapter. **FRONT ROW** (Left to Right): New registrants all from the Ill. Division of Highways—John H. Dierkes, Denny R. Benner, Arthur G. Roughley, Tsu Ming Yang.

## IN NEXT MONTH'S ISSUE:

N.S.P.E. Proposes Certification Program for  
Engineering Technicians and Certified  
Engineering Technologists

Collective Bargaining By Nurses and  
Other Professionals: Anomaly or Trend?

I.S.P.E. to Present Shedd Memorial Plaque  
to University of Illinois

## PROFESSIONALISM AND THE ENGINEERING STUDENT

(Continued from page 1)

to see why it is necessary for him to spend time on problems that, to him as a student, do not exist. As a consequence, the inclusion of a course dealing with the many facets of professionalism is not the complete answer. This is the serious problem. How can he be convinced that professionalism is an important aspect of his purpose?

One notable variation in this problem relates to the background of the student. Students come to the university from families in all activities of society. Some have actually worked for a time where membership in a labor union was necessary. Others have brothers, uncles or fathers who are members of labor unions. They have heard the union philosophy since their earliest memory. Some have accepted the philosophy as being good and genuine. How can they be persuaded to accept the philosophy of true professionalism when it is diametrically opposed to that of the labor union? How can he be shown that the union philosophy is incompatible with true professionalism?

There is yet another factor that should be mentioned. We are living in a time when there is in process a trend toward a lower moral and ethical code. As examples, the rigged TV shows, payola, and the easy buck. The moral values of society are being attacked by 'pulp magazines'. There is a noticeable laxation in the moral and physical discipline in the home, church, school and society generally. The accepted philosophy related to the social laws governing our country contribute to the general decline of the individual's responsibility to his society.

What is the solution to the problem? NSPE has adopted the policy that "Engineering curricula should give particular attention to inculcating professional concepts among engineering students preferably by establishing a specific course directed to this end". This is not enough. The student would accept more readily the importance attached to professionalism if it were apparent to him that all members of the staff placed emphases on the professional aspect of his education.

The student should become aware of the registration laws of his state. He should be encouraged to obtain the Engineer-In-Training registration as soon as he has had the necessary experience. In most states, he has accumulated that experience by the time he reaches his last semester's work leading to the baccalaureate degree. No student in engineering should pass up this opportunity to complete this part of his registration. In connection with this part of the problem, it must be said that the staff at the University of Illinois is doing a good job. A high percent of our graduates have taken this examination before leaving the campus.



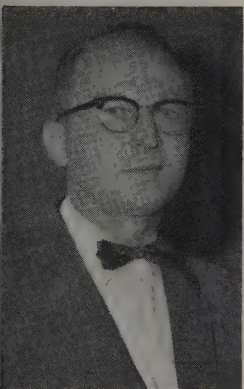
(Continued from page 5)

is in the form of four pages and is devoted to the various activities of engineers in government. "The Newsletter marks another milestone in N.S.P.E.'s program of constructive service to the engineering profession. It is designed to further communications among all engineers in government practice, and between the N.S.P.E. Functional Section for engineers in government practice and government functional sections at the State and local level. We view this newsletter as being a clearing house for the exchange of information and news on all developments of particular interest to engineers in government practice and to their respective employers."

The Functional Section will appreciate any news items from engineers in various government agencies at all levels.

### C. E. MISSMAN REPORTS:

President Noah Hull reported on "The State of the Society" at the opening dinner. The membership growth to date has been smaller than past years and members in arrears 5% above average. Each state was strongly urged to concentrate on bringing all memberships in arrears up to date as soon as possible before they become next year's delinquents. As of September 30th, the total membership was 52,905, which represents an increase of 2,810 in the past 12 months.



C. E. Missman

The report of the Membership Committee shows that of the 28 state societies using the introductory membership plan, 42% of the 1959 introductory members had paid 1960 dues as of August 2, 1960. A three-point program was proposed to obtain members:

1. A direct approach to states and chapters to launch concentrated membership programs using all the tried and proven techniques, such as: contests, state and regional membership conferences, and individual recognition of effective work.
2. A long-range plan of "Training for Membership" whereby prospective members are sponsored for several months by a NSPE member and an Indoctrination Team of informed members will present the facts and interpret the Society to groups of new members.
3. The addition of staff personnel to support programs in the area of membership and chapter activities.

At the regional breakfast of the Central Area, presided over by Vice President Ben G. Elliott from the University of Wisconsin, an informal discussion period included the status of registration of college of engineering staffs. A nationwide study is now being made

of this subject. Preliminary reports indicate that on the average only 35% to 40% are registered. These men have the first opportunity to emphasize professionalism to the students, aid in student chapters, and encourage registration. Hence, it is important that our college of engineering staffs be registered. It was pointed out that many fail to register due to a continuous lifetime as a student, studying for advanced degrees and teaching, with little opportunity for practical experience. They are often reluctant in later life to risk the stigma of failing that portion of an examination based on practical experience.

The Young Engineers Committee has now prepared an "Engineers' Record Book" and it is available for distribution. In this, the graduate can keep a complete record of college activities, previous employment and references, social, civic, fraternal, technical, religious and political affiliations. As his career progresses, he will have an immediate reference to all previous activities.

The Committee on Engineering Preparation reports that 700 chapters of JETS are now active in high schools and carry out programs related to science and mathematics.

As an item of new business, the Ohio Society requested NSPE to contact the U. S. Department of Labor regarding their ruling of June 29, 1960 that certain members of survey crews, such as rodmen, chainmen and Instrument men are covered under the Davis-Bacon Act. This would require that prevailing wage rates be established for these surveying classifications by union agreements and would apply on all projects where federal funds are involved. The further implication is that it would apply to both governmental agencies and private industry. The Board adopted a resolution to the U. S. Department of Labor presenting the position that field party personnel do not fall within the province of the Bacon-Davis Act requirements.

The Illinois Society had placed a Resolution before the Board last June concerning Federal Government contracts with engineers which do not require the engineer to be a registered professional engineer. This was similar to a resolution previously presented by the Minnesota Society, which the June Board meeting referred back to Minnesota for clarification. No action was taken at the October meeting on the Minnesota resolution, and it is likely that when it is forthcoming the same ruling will be placed on the Illinois resolution.

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(Continued from page 7)

In addition to the surface chart the forecaster makes use of upper air analysis in sharpening his forecast. By use of data obtained from radiosonde, pilot balloon or rawin observations he is able to determine the extent and physical properties of each air mass. Then, if he can define the discontinuity between the air masses which is generally in the form of a weather front he will be able to work out a relationship between the different masses. In order to define the structure of each air mass, the forecaster must know and understand the significance of temperature, humidity and lapse rate at different levels. These data, which are radioed down from the radiosonde balloons will tell him the degree of stability or instability of the air and whether it is stratified or well mixed. Such data will show up the existence of inversions, where temperature increases instead of decreases at altitude. He must decide whether the inversions are due to warm currents of different air masses or to possible subsidence of the upper air. He will generally want to make vertical cross sections of the atmosphere in order to ascertain the slope of the weather front.

These are only general considerations. Knowing the general synoptic situation, he must now study the individual reports of Weather Stations which he receives by teletype every hour or at closer intervals during times of bad weather. In addition he will study the reports of pilots flying through his area and will pay particular attention to radar reports which indicate the amount of cloudiness and location of storms. All these thousands of pieces of meteorological information will sift through the brain of the forecaster and with all these facts pigeon-holed in his brain he will mix them in with past experience and intuition and come up with what we know as a weather forecast.

A weather forecast is a prediction of the occurrence of a condition. In addition, the forecaster can also give out a warning which means that a dangerous condition has occurred or is in the state of occurring.

Storms vary in size, complexity and severity. There are the more obvious storms such as hurricanes which cut multi-million dollar paths of damage for hundreds of miles or short-lived tornadoes that completely level mile-long, block-wide urban areas. There are the excessive rainstorms that produce floods, the hailstorms that destroy crops or the ice storms that bring men's activities to a screeching halt and cause tremendous damage to trees, shrubs and interruption of public light and telephone services.

Much less appreciated are the damages that result from a few degrees drop in temperature, a sprinkle of rain, smoke in the atmosphere, or a change in wind direction. The natural gas industry is a good example. In order to anticipate natural gas heating demand distributors generally rely on forecasts of heating degree days for the four six-hour periods of the day starting



Author Roberts checks a lake level recorder

at 8:00 a.m. When a utility company is limited by the Commerce Commission to a maximum amount of gas that it may take from the interstate supply line, a lower degree day value than the forecast, coming especially during the last quarter of the day, may cause a greater than anticipated heat load and a penalty for taking more than the legal allowance of natural gas.

When dark clouds cast a mid-morning gloom over a large metropolitan area, an unscheduled load is placed on the electric power generating facilities unless radar or other information has warned the plant to anticipate the increased load required for artificial lighting.

Highway service crews gage their schedules by the latest weather advisory. The cost of removing snow from one storm for a metropolitan area like New York can be over a million dollars and the expense that results from an ice storm can be many times greater. On the other hand an unverified forecast of a storm can also be expensive due to the cost of stand-by crews that are not needed. In Illinois an average of 5 million dollars is spent annually keeping over 14,000 miles of paved road passable in winter. In addition to snow removal there is the cost of spreading calcium chloride, rock salt, cinders and sand on the pavements during times of ice. Highway engineers have to plan throughout the year in order to overcome the maintenance problems that will beset them in the winter months.

I am always a little sadder when I have to forecast bad weather for a week end. The manager of the local carwash will gage the number of extra washers he hires for Saturday by the Friday evening forecast that he hears or reads. Employment of many part-time workers will hinge on the forecast. The prediction of a pleasant weekend will prompt eating concessionaires to stock up on hot dogs and hamburgers and to unfreeze extra thousands of hot dog buns and other bakery goods. If inclement weather keeps the crowd away such con-



essions will lose money. Even the candy maker has his problems. He must vary the amount of thickener in his formula so that the coating on candied apples will be of the right firmness depending upon the temperature. Cake icing reacts promptly to changes in relative humidity. The confectioner will have a hard time icing doughnuts in air which has a high relative humidity unless he puts a thickener in his icing formula. Conversely if the weather turns dry the icing will be too hard.

Dense fog is often held responsible for sea and land accidents. Recently in Illinois a heavy fog on one of the expressways accounted for 21 cars and one truck piling up with serious injuries to 12 persons. Even with radar and other navigation aids, ships occasionally collide or are delayed by dense fogs.

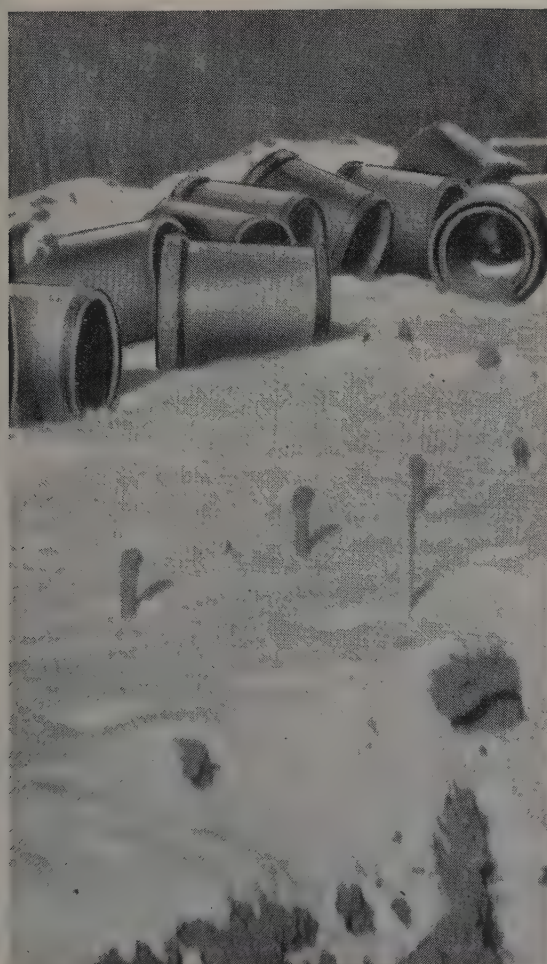
Many leaders in community and business life fly their private airplanes on business and other trips. During the winter months there have been serious private airplane accidents with weather a primary cause in a number of cases. Generally, training in the techniques of instrument (blind) flying requires as much time as visual flight training. Thus relatively few private pilots have qualified themselves for instrument flight and are unable to recognize dangerous weather conditions. As more of these private pilots participate in flight safety

programs, bad weather civilian flying accidents should decrease.

Commercial aviation is particularly alive to the importance of weather forecasts for scheduling flights. Generally a minimum ceiling of 300 feet and visibility of 3/4 mile determines whether a plane may land at a large airport. When a plane arrives over a terminal and cannot land because of low ceiling or other reasons, it may have to go into a "holding pattern" until planes that have landing priority are brought in by the air traffic control. The holding pattern gives a plane a safe 1000 foot vertical separation from surrounding aircraft but valuable time and fuel are consumed as it flies between two radio compass marker beacons while waiting clearance to a lower altitude. Without such controls commercial aviation would be brought almost to a standstill in what is called instrument flying weather.

The cost of maintaining these navigational aids is high. The components of instrument landing systems require constant service. In addition, many airports provide radar equipment. One type scans in all directions to pinpoint all aircraft in an area and is called "surveillance radar". The radar operator, by using

(Continued on next page)



## Army Corps of Engineers Specifies . . .

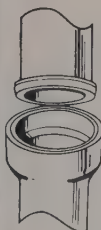
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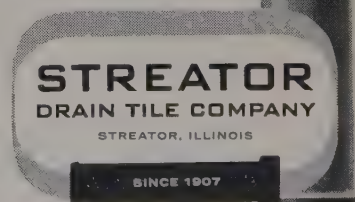
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"precision radar" is able to advise a pilot of his exact position during descent, thus confirming the information the pilot receives via the instrument landing system. As the cruising speed of commercial planes increases jet pilots are relying on such systems for routine landings in any kind of weather. Even when there is no actual need for radar or other navigational equipment, a pilot will often use these aids to check his landing procedure. But the low ceiling is still a problem that plagues airline weather forecasters.

"Why don't you forecast some rain so I can sell raincoats", quipped a friend in the clothing business. He explained that in a normal rainy springtime he sells hundreds of raincoats. The past dry spring upset his demand and he was stuck with a high inventory of rain-gear. Similarly, a mild winter will result in poor sales of heavy clothing; and nothing is worse for the merchant's "dollar day" sale than the forecast of bad weather at any time of the year.

People who work underground would normally be thought of as unaffected by weather. Yet the passage of deep low pressure storm areas over coal mines has been associated with mine disasters. In fact, many mines will not permit workers to descend when there is a chance of abnormal change in atmospheric pressure.

What is man doing about improving weather predictions? Many industries that are affected by weather changes subscribe to private forecasting services. In the United States there are about one hundred companies that specialize in tailor-made forecasts to such clients as gas utility companies that require estimated heat demands based on anticipated degree days, highway departments that wish to be warned a specific number of hours before snow or ice storms are likely to strike, or the chemical process company that must have accurate forecasts of maximum wet bulb temperatures so as not to overload its cooling towers.

The United States Weather Bureau has constantly improved its weather forecasting services through the years. Its hurricane advisories and warnings have saved countless lives and help protect million of dollars of property by warning those in the path of tropical storms. Even though damage due to these storms is high, it would be much higher if there were no Weather Bureau forecasts of storm movement.

In the matter of tornado prediction, much progress has been made so that areas where there is high probability of destructive storms occurring in a given period can be outlined in official severe weather forecasts. As soon as tornadoes are reported, whether aloft or doing damage on the ground, tornado warnings are issued that have enabled many persons to escape the paths of these furious storms.

New techniques for analyzing weather data are being used to improve forecasts. Satellites will eventually play an important role in increasing efficiency of long and

## ARBA'S "PLAN FOR ACCREDITATION OF CONSULTING ENGINEERING FIRMS FOR HIGHWAY AND RELATED PROJECTS" REJECTED

By HAROLD F. SOMMERSCHIELD  
ISPE Vice-President

A Central Region Meeting of the Functional Section for Consulting Engineers in Private Practice, NSPE, was held at the Indianapolis Athletic Club September 16th. Upon invitation from Mr. Clyde E. Williams,



Harold F. Sommerschild

Vice-Chairman of the NSPE Private Practice Section for Central Area, contact was made with Mr. Roland Olson, Chairman of the ISPE Functional Sections Committee, to arrange a trip to attend this meeting. The meeting was called to provide Mr. Williams with the opinion of Central Region state societies to direct his actions at the NSPE Board of Directors Meeting held in Denver, Oct. 19-21.

The main subject discussed in the morning session was the financing of private practice functional section activity. The consensus was that the activity of functional sections should be self-liquidating. It was not felt that the activity of the functional section should be financed by the NSPE.

The afternoon session was confined to a discussion relative to the "Outline Of Plan For Accreditation Of Consulting Engineering Firms For Highway and Related Projects," as submitted by ARBA to NSPE for consideration.

A review of this scheme revealed a number of factors which did not appear to conform with NSPE policy. The following is an enumeration of some of these factors:

1. A provision was made for a committee of inquiry

short range weather predictions. Exciting research projects are being vigorously prosecuted in the hope of modifying weather.

If Mark Twain's friend Charles Dudley Warner, were to say today "Everyone talks about the weather but no one does anything about it", his statement would be far from the truth. Many people are working hard on a host of problems connected with atmospheric physics. The atmosphere is vast and there is opportunity for all who answer its challenge to add their knowledge to the analysis of its forces and activities.



to investigate complaints of alleged lapses of professional performance. *No provision was made for a hearing at which individuals charged could defend themselves.*

2. The Accreditation Board was to be comprised of six members, one each appointed by the American Association of State Highway Officials, The Engineering Division of the American Road Builders Association, The American Society of Civil Engineers, The Consulting Engineers Council, The National Society of Professional Engineers, and the American Institute of Consulting Engineers. *It was noted that some of these organizations do not require registration as a qualification for membership.* It would appear therefore, that this accrediting board, which could be partially made up of non-registered professional engineers would be passing judgment upon persons that were registered. In effect such a procedure could supersede the action of the examining boards. *The opinion was expressed that the entire idea duplicated the work already done by the various state registration boards and was therefore redundant.*

3. An applicant had the option of requesting accreditation in any one or all of seven-categories of highway design. *It was felt that this would tend to split the profession into a number of splinter classifications.*

4. Another requirement was that an applicant had to have at least 10 years recent experience, have at least

two members of his staff with 5 years experience and responsible charge, and must submit a list of 5 references of character, professional and ethical standard and experience in highway work. *It was felt such stipulations would make it veritably impossible for any new firm to enter into this type of activity.*

After a considerable amount of discussion by all present a motion was made that the Private Practice Section of NSPE for the Central Area go on record as recommending to the National Function Section refrain from the further pursuit of the avenues portrayed in this document. The motion was duly seconded and unanimously passed.

A motion was also made and passed that any organization such as AASHTO, ARBA or any other interested organization advise the Ethics and Practice Committee of their respective State Professional Society and the Registration Board of any instances of incompetence or malfeasance. There were four dissenting votes to this motion.

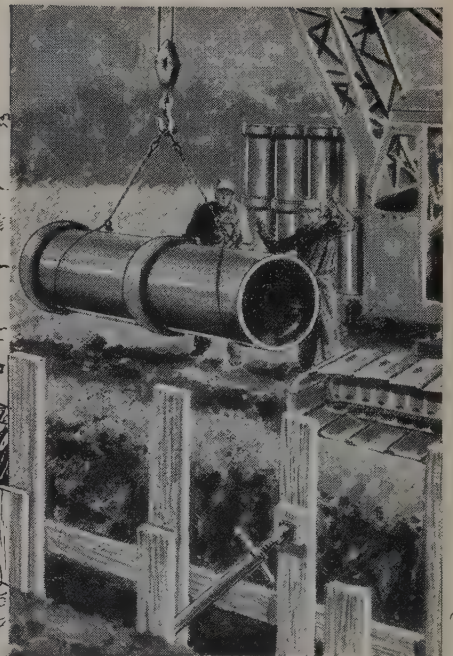
A discussion relative to supervision of construction was held. This discussion was precipitated by the fact that some engineers had been held responsible for failures which had occurred during construction. A number of alternate terms were suggested, as follows: Project control, construction administration, and engineering administration of construction.

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## I.S.P.E. NOMINATING COMMITTEE RECOMMENDATIONS

The following recommended slate of officers for 1961-62 has been submitted by the Nominating Committee:

OFFICE	TERM	CANDIDATE
President	1-year term beginning April 21, 1961	Harold F. Sommerschild
Vice President	1-year term beginning April 21, 1961	Manuel Garcia
Vice President	1-year term beginning April 21, 1961	C. Dale Greffe
Vice President	1-year term beginning April 21, 1961	Louis A. Bacon
Treasurer	2-year term beginning April 21, 1961	R. D. Collins
National Director	3-year term beginning April 21, 1961	Royce E. Johnson
National Director	3-year term beginning April 21, 1961	J. Raymond Carroll
Illinois Engineering Council Representative	3-year term beginning Jan. 1, 1962	Kenneth E. Welton

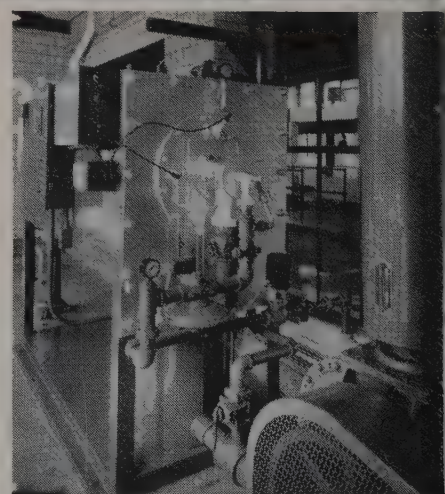
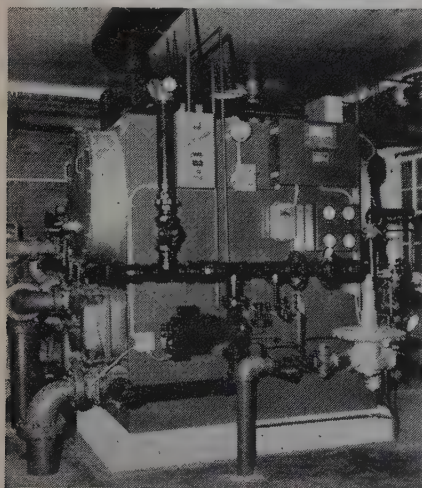
NOMINATING COMMITTEE—M. E. Amstutz, Chairman; A. J. Feickert, M. L. Burgin, Sander Friedman, James Gates, Kenneth Bowman, Maurice Webb, Carl Bowen

The above slate, plus nominations by petition, will be mailed to all Corporate Members of the Society between December 21, 1960, and January 21, 1961, with polls to close at 12:00 noon, February 27, 1961.

Nominations by petition, signed by not less than fifty Corporate members, shall be filed with the Secretary not later than four months prior to the annual meeting, or by December 21, 1960.

Results of the election will be published in the March issue of The Illinois Engineer.

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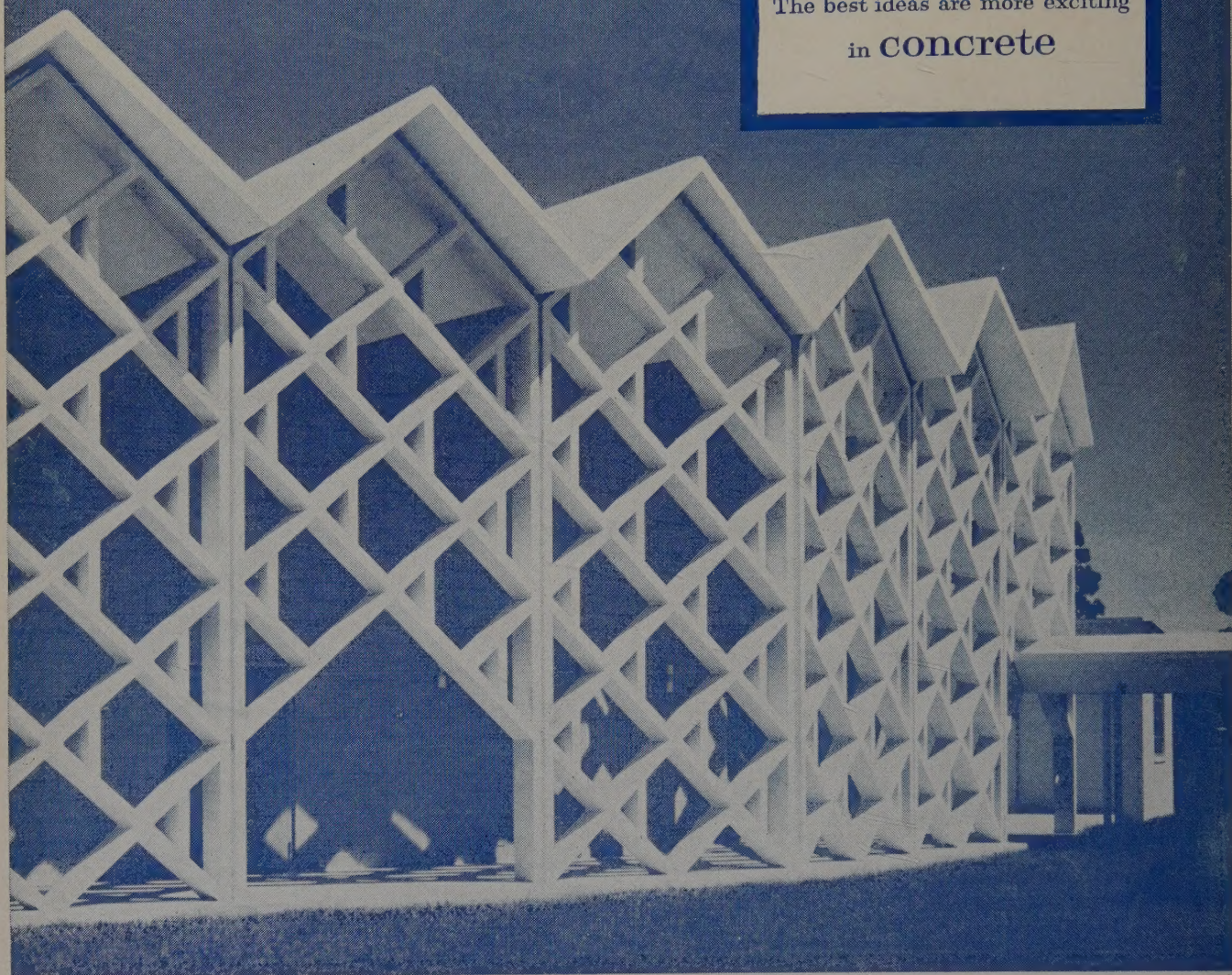
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